Quantifying Varroa Resistance to Miticides in US Honey Bee Colonies

Project Leader: Dennis vanEngelsdorp
CMNS – Entomology, University of Maryland, College Park, MD 20742
(717) 884-2414 dennis.vanengelsdorp@gmail.com

PROJECT SUMMARY

Objectives:

- Survey the susceptibility of the US varroa mite population to both registered and unregistered mite control products.
- Rapidly communicate mite susceptibility and resistance levels to US beekeepers so they can make informed mite control decisions.

Background and Discussion:

While many factors contribute to honey bee declines, there is consensus that the single most important contributing factor is varroa mites. To control these parasites, beekeepers rely on a handful of mite control products. Unfortunately, mites have developed resistance to many of these products, and/or the product's efficacy is questionable. This is of serious concern, as beekeepers need to be aware of which products will be effective in controlling the mite population in their operation. With some assurance as to which products will work, beekeepers can avoid unnecessary chemotherapy treatments, reduce unexpected losses, and improve the general welfare of their colonies. Further, there is a critical need for resistance management. One aspect of this is to bring to the market novel varroacide chemistries that target unique resistance avoidance pathways.

In anticipation of funding, we began preforming resistance assays on live bees collected for National Honey Bee disease survey at the beginning of the year (April 7, 2014). In all samples from 116 apiaries were received with sufficient bees. Of these, samples from 69 different apiaries met criteria to perform at least one successful assay of at least one mite control product. The resistance assay involves placing approximately 300 bees in a cage along with a small strip of miticides (after Pettis et al. 1998).

A total of 4 different products were tested for resistance (**Table 1**), all but Flumethrine is labeled for use by beekeepers in the US. A population of mites was considered highly resistant, if it failed to kill less than 15% of the mites in the assay; resistant if it failed to kill fewer than 40% of the mites in the assay.

There was no evidence of Amitraz resistance in tested colonies (**Table 1**). Comaphos resistance was evidenced in 39% of tested populations, with 13% of mite populations considered highly resistant. Apistan resistance was less prevalent with 12% of populations demonstrating some level of resistance, and only 3% considered highly so. Few colonies were resistant to flumethrine.

Table 1: Percentage of Mite populations with sufficient mites to permit testing that were resistant or highly resistant to mites.

Product	n	Resistant (%)	Highly Resistant (%)
Amitraz	53	0	0
Apistan	60	12	3
Coumaphos	54	39	13
Flumethrin	34	6	3

Preliminary results reaffirm the urgent need for additional mite control products for the bee industry.

Project Cooperators and Personnel: Sam Abban and Jeff S. Pettis, USDA-ARS, Beltsville Bee Lab; Troy Anderson, Virginia Tech. Additional support for this project was received from USDA-APHIS.

For More Details, Visit

- Poster location 3, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2015) at Almonds.com/ResearchDatabase
- Related project: 14-POLL6A-Anderson/vanEngelsdorp